program and most leave to work with the State of Alabama, although a few have gone to work in Florida.

E. Career Potential

Environmental Health Administration officials anticipate that chemical engineers and sanitarians have the best career potential in Alabama's solid waste management program in the next five year period. Persons with private industry experience in techniques of hazardous waste disposal might have an advantage in obtaining employment in the new state hazardous wastes management program. Companies such as Du Pont, Monsanto and Rollins which may receive the state contract to operate the wastes disposal sites, may have additional workforce needs as a result of the new federal and state legislation. State officials were unable to identify any new or unique careers arising in the field of solid waste management in the next five years, other than those associated with hazardous waste management.

F. Conclusion

The Division of Solid Waste and Vector Control is one of the few Alabama pollution control and abatement programs expected to have any growth over the next five years. This growth will be direct consequence of the new Resource Conservation and Recovery Act's program to provide grants to states to develop disposal plans. During the previous legislative session, the Alabama Legislature had before it a similar hazardous waste management act which was not enacted. The Act was included as part of the Department of Public Health's legislative proposal and it was very similar to the recent federal Act. The State of Alabama was ready to proceed on the hazardous wastes problems because the need for it was already perceived. Consequently, passage of the federal hazardous wastes

management legislation is likely to compel the Alabama Legislature to enact the State Department's of Public Health's legislative proposal during this present session. Private industry also realized that such legislation was imminent and their attitude toward cooperating with the State of Alabama to deal with the program was very favorable. Thus, the State of Alabama may be one of the first states in the nation to take direct steps to deal with the problem of disposing of hazardous wastes materials.

VII. WASTEWATER

A. Introduction

The Alabama Water Improvement Commission (AWIC) exercises principal program responsibilities for Alabama's wastewater pollution control and abatement activities. Legislative authority was provided through the State's Water Pollution Control Law (Act 1260), enacted during the Alabama Legislature's regular annual session of 1971. The Act prescribes the commission's jurisdiction, powers and duties and provides for enforcement of the commission's rules and regulations. The commission is composed of five voting members appointed by the Governor and two non-voting members. The five voting members include an attorney, a physician, a registered professional engineer and two Alabama residents who possess no special expertise. The State Health Officer of the Alabama Department of Public Health serves as the commission's Chairman and the Director of the Department of Conservation serves as the vice-chairman. The Director of the Environmental Health Administration of the Department of Public Health serves as the commission's technical secretary and is responsible for coordination of the commission's and the administration's activities. A three-member Technical Advisory Committee composed of the Commissioner of Agriculture and Industries, the Director of the Department of Conservation, the Director of the Alabama Development Office and the state geologist was also created through the enactment of Act 1260. A chief administrative officer is appointed by the AWIC to direct the commission's technical staff. This official is to manage the implementation of the programs mandated by federal and state wastewater pollution control laws.

A second state law, Act 1594, created a Board of Certification to provide for a mandatory certification program for wastewater treatment plant operator and asked the AWIC to provide support. Certification examinations are administered by the Board of Certification and certificates are granted after passing a written examination. The examinations are given usually twice a year at an annual Short Course School and at selected locations decided upon by the board. The certificates indicate the classification of facilities that operators are qualified to operate. Consideration is being given by the board to adopt regulations to include certification of operators of industrial facilities, as well as operators of waste treatment facilities serving semi-public and private facilities.

During Fiscal Year 1976, the commission completed and began operation of its first field office in Birmingham and hopes to establish a second field office in Mobile by mid-FY '77. Construction grant activities received priority in the commission's program during FY '76 and these activities are again expected to receive priority in FY '77. The rapid processing of grant applications is another priority to which the AWIC has committed themselves during FY '77 as the commission fell slightly behind in its anticipated numbers of grants by types during FY '76. The AWIC has also contacted the EPA Region IV Office for assumption of NPDES permitting authority. A revised proposal for new water quality standards is now being reviewed by the Region IV office of the U.S. Environmental Protection Agency. According to the commission's "Program Submission 106 for F.Y. 1977", the following areas have been identified for resolution in order for a program implementation agreement to be worked out between the state and EPA:

1) Permitting of surface mining activities;
2) Permit reissuance, to include the possible use of class permits;
3) Monitoring requirements, to include the possible use of class permits;
4) Commission action in permit approvals;
5) Enforcement activities and resources;
6) Compatibility of permits and construction grant activities.

The Alabama Water Improvement Commission, under Alabama law, is charged with the technical review of plans and specifications relating to the construction of waste treatment facilities. The commission has proposed a comprehensive management approach to EPA leaving administrative review of the program to EPA while assuming full responsibility for O & M review, interim inspections, and other technical matters. The commission also has proposed a similar approach for the review of change orders, i.e., leaving administrative responsibilities to EPA.

The commission also questions the validity and reliability of data produced by the self-monitoring requirements for municipal permit holders under the NPDES program. The commission has been suggesting to Alabama's municipalities that they investigate various possibilities for meeting the monitoring requirement, to include the concept of creating regional laboratories under such an arrangement, one municipality would provide laboratory services for others surrounding it and using municipalities would pay on a fee basis.

A monitoring strategy is being implemented by the AWIC to continue monitoring at its trend stations. According to the "Program Submission 106 for F.Y. 1977", the AWIC operates 63 trend stations in 19 river

basins with or without flow data. Flow data are currently available for 38 of these trend stations. A total of 28 biological trend stations in 10 river basins are operated with 14 involving fish samples and 14 involving micro-vertegrate samples. A total of 59 ambient trend stations are also operated by the AWIC.

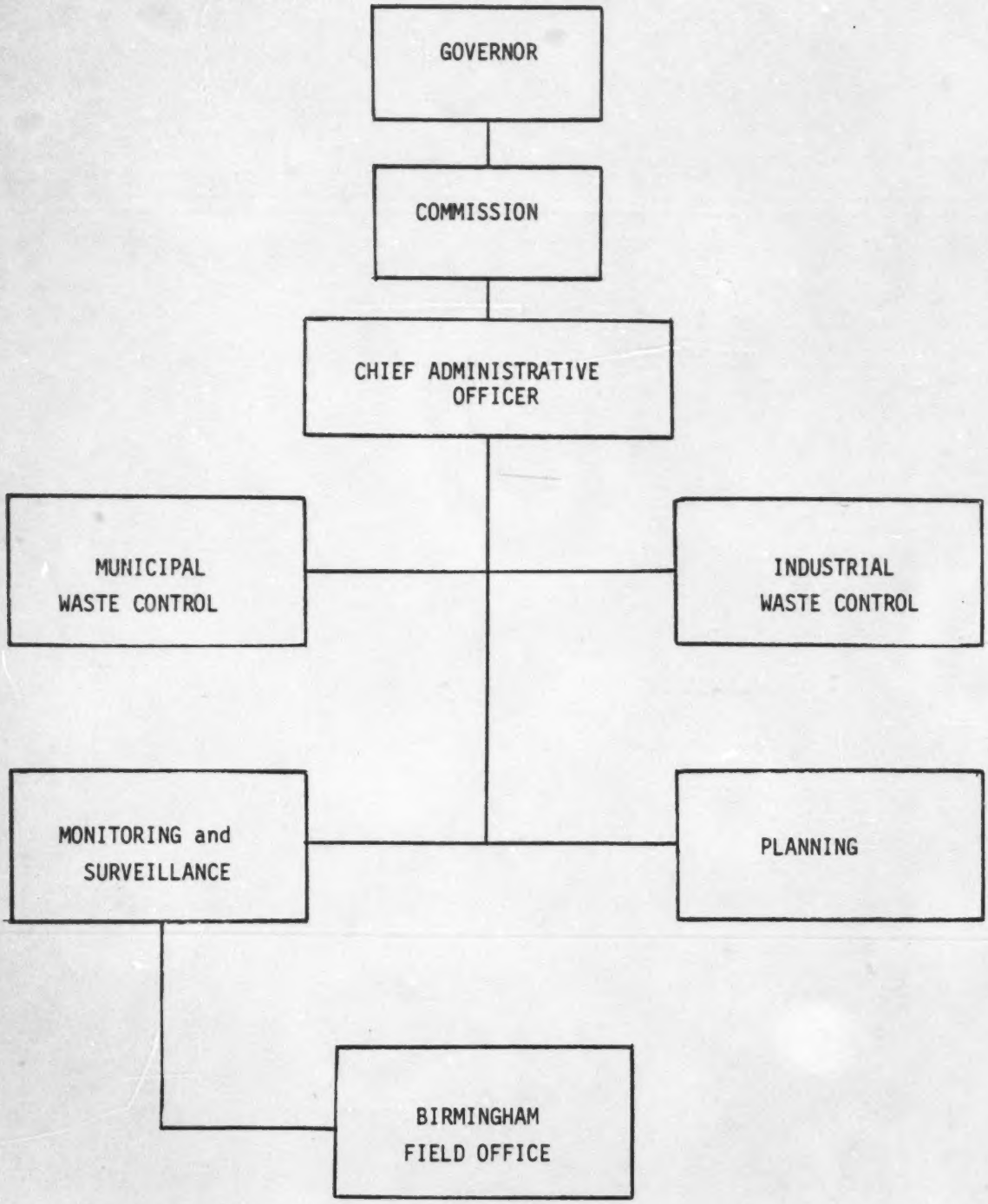
Alabama has 182 "Major Municipal Dischargers" under NPDES permitting authority according to "Program Submission 106" information. Forty-three of the major municipal dischargers are in compliance with EPA Water Quality Standards while 139 are not in compliance. However, according to the Alabama Water Quality Standards, 130 are currently in compliance while 52 are not.

Alabama also has 169 major non-municipal dischargers of which 71 are in compliance with EPA Water Quality Standards and 75 are in compliance with State Water Quality Standards as of March 12, 1976. According to the Report's Construction Grants Project List for 1977, Alabama has a total of 362 facilities with projected needs. Total EPA assistance required is over $162 million. The report indicated that 72 facilities are in the Step I phase of the program, 169 are in Step II and 121 are in Step III phases of completion.

In addition to the NPDES program, the Alabama Water Improvement Commission also wishes to assume program responsibility for small business loans, and other parts of the construction grants program since the commission currently reviews plans and specifications on all projects discharging into Alabama's waters and now handles "in-furtherance" certification of water pollution control projects.

ALABAMA WATER IMPROVEMENT COMMISSION

Figure 4



Strip mining activities in the northern part of Alabama have dramatically increased since 1974. The Alabama Legislature adopted Surface Mining Regulations in 1975 and established a Surface Mining Reclamation Commission. The Alabama Water Improvement Commission has jurisdiction over the water quality aspects of strip mining and has added a permitting and identification of discharges program to its activities.

B. Workforce Profile

Administration of the commission's technical staff is charged to a chief administrative officer who is classified under the state merit system as a Water Quality Control Engineer. The total staff of the Alabama Water Improvement Commission at the present time (1976) is comprised of 63 persons and 19 vacant positions which are authorized to the commission by the Legislature. The total includes the Birmingham Field Office which just became operational during Fiscal Year 1976. Of the 63 employees, 41 have professional positions and 22 persons have clerical or temporary positions. The chief administrative officer receives administrative support assistance from an attorney, a legal research aid, an accountant, a switchboard operator, an administrator and two clerks. Four sections under the chief administrative officer provide the following abbreviated functions:

1) Industrial Waste Control Section: Reviews plans and specifications for upgrading of industrial wastewater construction plants. Conducts inspections of these facilities to determine their operational status. Develops a list of major industrial dischargers. Reviews plans and specifications for treatment facilities which discharge to the sewers of Alabama's municipalities. Reviews NPDES permits, drafts state permits, assists in monitoring studies and responds to citizen complaints. Regulates the water quality aspects of strip mining.

2) Municipal Waste Control Section: Provides technical services to municipalities, institutions and commercial enterprises on sewage treatment and disposal problems. Reviews engineering reports, plans and proposals for domestic waste treatment facilities. Inspects completed projects, performs routine inspections, develops waste and stream monitoring programs and determines compliance by municipalities and others discharging sewage with water quality standards and requirements of the Commission. Provides state efforts in association with construction grant activities.

3) Monitoring and Surveillance Section: Plans and performs basic laboratory monitoring of the quality of the state's waters. Reviews applications for permits from federal agencies and provides certifications required under Section 401, Public Law 92-500.

4) Water Quality Management Section: Responsible for the execution of water quality management planning (Phase I basin plans and statewide 208 Planning), water quality standards, non-point source programs, and automatic data-handling systems. Involved in 208 Planning in designated areas and reviewing and approval of 201 facility plans.

The Alabama Water Improvement Commission, headquartered in Montgomery, is integrated into the program activities of other state pollution control and abatement regulatory agencies. Laboratory analytical work is performed by the Environmental Health Administration Laboratory and financial and payroll services are provided by the Alabama Department of Public Health. A full-time attorney was assigned to the commission by the Environmental Protection Division of the Alabama Attorney General's Office. The commission also assists the Division of Radiological Health, a part of the Environmental Health Administration, in the collection of water samples for radiological analysis purposes. The commission further assists the Board of Certification for Water and Wastewater Plant Operators in preparing and conducting examinations and in investigating and evaluating plant performance and is required by Alabama law to coordinate location of landfills to avoid water pollution problems.

The Alabama Water Improvement Commission's technical staff located at the central office in Montgomery and at the Birmingham field office together account for a total of 29 professionals and 29 clerical, technician and administrative positions involved in wastewater pollution control activities in 1976. The total of 63 positions includes approximately 9 student aides employed through a cooperative arrangement with Alabama's universities and colleges on a rotational basis. Engineers predominate in Alabama's wastewater pollution control and abatement program.

The following table depicts the total number of personnel employed by the Alabama Water Improvement Commission in 1976, both in Montgomery and in the field office at Birmingham.

TABLE XV

ALABAMA WATER IMPROVEMENT COMMISSION

Wastewater Pollution Control Program Personnel
Current (1976) Staffing Level

Position	1976
Engineer	20
Attorney	1
Biologist	6
Chemist	1
Scientist	6
Technician	11
Other	18
TOTAL	63

The preceding table does not include 19 vacancies which the commission cannot financially support in its budget but which are authorized for it. Engineers employed by the commission are classified in Alabama as public health engineers. The total of 20 engineer positions depicted in Table XV also includes the chief administrative officer who is classified as a water quality control engineer. Most of the engineering

personnel employed by the commission have a civil or chemical engineering educational background and are hired to perform sanitary engineering duties. Most of the engineers currently employed by the commission have bachelor degrees,but many are sent at state expense to receive graduate education (M.S.), in sanitary engineering. To advance in state service in Alabama, the employee,at some point in his career development, must obtain a master's degree and be a registered professional engineer. Chemists employed by the State of Alabama must have both a degree in chemical engineering or chemistry and possess experience performing chemical analysis. Water pollution control biologists, according to the state merit system, are required to have bachelor's degrees in biology with coursework in organic and inorganic chemistry with subsequent requirements for an M.S. in higher level positions.

Of the six positions included in the "scientist" classification in Table XV, all are classified as pollution control specialists, who have bachelor's degrees in science fields such as biology, chemistry or geology. Four of the six pollution control specialists have been assigned to the Industrial Waste Control Section to investigate strip mining operations of coal in the northern part of Alabama.*

One of the positions included in the "technician" category in Table XV is classified as an environmental health specialist. A person employed in this position must be a high school graduate and must have taken advanced mathematics courses. The ten student aides are also included in the "technician" classification. They are assigned to duties such as collecting water samples and transporting them to laboratories for analysis.

*The other two assist in the Municipal Waste Control effort.

The "other" positions referred to in Table XV include an attorney, a legal research aide, an accountant, a health services administrator, a federal grants project analyst, a resource planner, an information systems specialist, an administrative trainee, an illustrator, a switchboard operator and eight clerk-stenographers.

In Fiscal Year 1977, water quality management planning, water quality standards review, and non-point source programs are all to be accomplished under the State of Alabama's Continuing Planning Process (CPP) which was established through an agreement with the U.S. Environmental Protection Agency pursuant to Sections 208 and 303e of PL 92-500. The commission has been designated under the agreement as the State Planning Agency responsible for the achievement of the Alabama water quality management program goals. Three local areawide planning agencies have been designated under the 208 water quality management program. These include the Birmingham Regional Planning Commission, the South Alabama Regional Planning Commission in Mobile and the West Alabama Planning and Development Council in Tuscaloosa County. These three local planning agencies are responsible for the 208 Planning for seven agencies. They employ ten full-time people for their planning activities. The target dates for completion of planning processes are April, 1978, for the Birmingham and Mobile programs and September, 1977, for the Tuscaloosa program.

Wastewater treatment plant operators in Alabama are certified according to the size and the type of treatment plants they are responsible for operating. For example, a Grade I operator operates primary and lagoon type plants, whereas Grades II, III and IV operators operate trickling filter and activated sludge type plants. Treatment plants

Grade I and II require an operator at least equal to the facility grade. Grades III and IV treatment plants require an operator to be certified at least one grade below the facility grade provided that an operator certified at least equal to the facility grade is on call and could normally be on site within 30 minutes. The following table depicts the current distribution of certified waste treatment plant operators by grade classification as of February 4, 1977.

TABLE XVI

STATE OF ALABAMA

Certified Wastewater Treatment Plant Operators
Current (1976) Staffing Level

Classification	1976
I	163
II	145
III	171
IV	175
TOTAL	654

Alabama Water Improvement Commission officials estimated that the current total number of persons employed in the field of wastewater pollution control and abatement in Alabama is approximately 1,300. This total includes the public and private sectors. The public sector total includes the AWIC and the local 208 Planning agencies and the private sector figures include certified treatment plant operators, non-certified operators such as trainees, consultants and engineers employed by industry in Alabama.

C. Workforce Projections

Workforce projections for the Alabama Water Improvement Commission for the next five-year period are based on professional judgements of its administrative officials. A portion of the FY '77 budget proposed to EPA and the state legislature is expected to be utilized in filling some of the authorized but currently vacant positions. According to the commission's "Program Submission 106 for F.Y. 1977", positions planned to be filled include four engineers, one biologist, two chemists and two pollution control specialists. As of February, 1977, commission sources indicated that one chemist, one engineer, one attorney and two secretaries have already been added to their staff.

The commission experiences an average annual turnover rate of between twenty to twenty-five percent which translates to between twelve to fifteen positions lost through employee turnover. Official sources stated that most of the employee turnover is among engineers, pollution control specialists, systems analysts, clerks and student aides, and is usually attributed to low salary and lack of advancement opportunity.

Few new federal programs are anticipated to be added to the commission's program over the next five year period, and the legislature is considered not amenable to authorizing funding for sizable staffing increases. Staff growth rate under such conditions is projected to average about seven percent or about three to four positions annually added to the staff. Recruitment emphasis is likely to be placed upon hiring additional engineers and biologists. A principal reason for the skepticism among commission officials concerning major staffing increases over the next five-year period arises from the seven and one half percent cut in the Public Health budget imposed between 1975 and 1976 by the legislature.

As pointed out earlier, officials consider the Alabama Legislature to be fiscally conservative and unwilling to increase the state's tax base. The following table depicts possible staffing increases for the Alabama Water Improvement Commission over the next five year period, based on the professional judgment of its administrative personnel.

TABLE XVII

STATE OF ALABAMA

Wastewater Program Operations
Workforce Projections to 1982 (est.)

Position	1976	1977	1978	1979	1980	1981	%/annum turnover (average)	%/annum growth (average)
Engineer	20	22	23	24	25	26	n/a	5%
Attorney	1	2	2	2	2	2	n/a	20%
Biologist	6	7	8	9	10	11	n/a	13%
Chemist	1	2	2	3	3	3	n/a	30%
Scientist	6	7	8	9	11	12	n/a	15%
Technician	11	11	11	11	11	11	n/a	0
Other	18	19	22	23	24	25	n/a	7%
TOTAL	63	70	76	81	86	90	22%	7%

The above table depicts what Water Improvement Commission sources project to be the agency's workforce needs over the next five-year period. They could not project with any degree of assurance what the legislature will finally approve. There is a possibility that the only positions that the commission will receive budgetary support for in the next five year period will be replacements for personnel lost through employee turnover. State sources also indicated that the commission may be reorganized due to proposals which will be considered by the Alabama Legislature in its 1977 regular session. The reorganization proposal has the support of the Alabama Governor, and there is some possibility that the measure will be approved. A second field office may be established

in 1977 or 1978 in Mobile if the Alabama Legislature approves funds to support the commission's request in it's Fiscal Year 1977 budget.

Alabama Water Improvement Commission sources indicated that the number of certified wastewater treatment plant operators will possibly increase by 50 percent by 1982. The principal reason for such growth is due to the fact that more facilities will be operational and others will be upgraded through the construction grants program. Grade I plants, which include existing primary plants and nonaerated lagoons will receive attention, with primary plants to be phased out or upgraded. Nonaerated lagoons are expected to be maintained as treatment systems. Professionals project that the total number of Grade I plant operators will decline by ten percent as many of the primary plants are phased out. The total number of Grade II (trickling filter 1.0 MGD or less activated sludge 0.5 MGD or less) treatment plant operators is anticipated to increase by approximately twenty percent by 1982. The largest increase of plant operators (40 percent) is expected to be of the Grade III classification (trickling filter 1.0 MGD through 10.0 MGD/ activated sludge 0.5 MGD through 5.0 MGD). No significant increase in the number of Grade IV treatment plant operators (trickling filter above 10.0 MGD/activated sludge above 5.0 MGD) is expected in the next five years. It is worthy of note that Jefferson County (Birmingham), which has many Grade III treatment plants, requires that supervisors must be certified as a Grade IV operator before they are allowed to operate a Grade III facility. The following table represents what commission representatives project the workforce for certified wastewater treatment plant operators to be by 1982.

TABLE XVIII

STATE OF ALABAMA

Wastewater Treatment Plant Operators
Workforce Projections to 1982 (est.)

Classification	1976	1977	1978	1979	1980	1981	%/annum turnover (average)	%/annum growth (average)
I	163	160	157	154	151	147	n/a	-2%
II	145	151	157	163	169	174	n/a	4%
III	171	185	199	213	236	240	n/a	7%
IV	175	175	175	175	175	175	n/a	0%
TOTAL	654	671	688	705	731	736		2%

D. Training and Certification

All Alabama Water Improvement Commission personnel receive training on the job which involves a work assignemtn with an experienced staff member until such time as the new recruit demonstrates sufficient competency to work independently. Staff members also attend, at state expense, short courses conducted by EPA. The Industrial Waste Control Section's staff is sent to EPA technology transfer seminars at Cincinnati's National Training Center, whenever industrial waste pollution subjects of concern are addressed. According to total Fiscal Year tabulations for 1976, Alabama sent 12 persons to National Training Center courses.

Engineers and technical personnel from the Industrial Waste Control Section are sent to at least two seminars each year. The seminars range from the Purdue Industrial Waste Conference to continuing education courses sponsored by local universities and EPA technology transfer sessions and courses. All personnel are required to keep an experience list of training courses and seminars attended.

In the opinion of Alabama Water Improvement Commission sources, engineering personnel with a basic bachelor degree education do not possess sufficient knowledge of wastewater pollution control and abatement techniques upon graduation. These sources indicate that an advanced degree in such fields as sanitary engineering or aquatic biology is required. Most chemical engineers also do not currently receive any waste treatment instruction during their undergraduate training.

The Alabama Water Improvement Commission usually sends at least one staff engineer or biologist back to school for an advanced degree each year. Personnel are usually selected from the Industrial Waste Control Section, the Municipal Waste Control Section and the Water Quality Management Section on a rotational basis. Staff professionals receive full salary, an educational leave of absence (limited to one year), tuition and travel expenses to and from the educational institution. Such advanced training is considered necessary for the upgrading of the commission's staff technical skills. Personnel, after attending such long-term training programs, usually receive promotional considerations upon return. Engineers and biologists are usually sent for Master's Degrees in an appropriate field at such educational institutions as Purdue, Harvard, Clemson, the University of Florida, Vanderbilt, Georgia Tech, Mississippi State, the University of Michigan and the University of Texas. Biologists are sent to the University of Florida or Iowa State University for Master's Degrees in Aquatic Biology. Personnel also attend resource management and computer systems courses offered by Clemson.

Many of the commission's current engineering staff are graduates from Auburn University's engineering program and more applications for employment are received each year from Auburn University engineering graduates than from any other educational institution. Commission officials hold both the University of Alabama's and Auburn University's undergraduate engineering programs in high regard.

Training for wastewater treatment plant operators and water plant operators is conducted jointly during an annual Short Course School sponsored by the Alabama Water and Pollution Control Association (re: report IV: Potable Water for Alabama). Instruction is also given by the State Department of Education's Post-Secondary and Continuing Education Division. The Alabama Water Improvement Commission actively supports the Department of Education's operator training program, and, the commission is represented on the Operator Training Advisory Committee. One full-time instructor has been employed by the Department of Education to provide operator training across the state with assistance provided by local officials. The courses are taught on a rotational basis at selected sites across the state and the courses are designed to last approximately one week. They begin with basic mathematical instruction and progressively lead to more specific subjects such as laboratory control and plant operations. The commission provides input by formulating the material to be presented and coordinating the program with local officials. No tuition is charged to the operators attending the classes, and each class is usually attended by between fifteen to twenty persons. The Alabama Water Improvement Commission's "Program Submission 106 for FY 1977" tabulated the number of students attending the program during

Fiscal Year 1975 and included estimates of those expected to attend during Fiscal Years 1976 and 1977.

TABLE XIX

STATE OF ALABAMA

Department of Education Operator Training Programs (est.)

Fiscal Year	# Basic Classes	Atten.	# Adv. Classes	Atten.	Total Classes	Total Atten.
1975	23	405	21	346	44	751
1976	24	357	24	348	48	705
1977	23	350	23	350	46	700

E. Career Potential

According to commission officials, the potential for employment in any new areas with the Alabama Water Improvement Commission in the next five years is not very promising at the present time. No new careers were identified by Alabama program officials in the field of wastewater pollution control and abatement and personnel actually recruited over the next five years will be of the same types that presently staff the commission's technical program. An Alabama resident seeking employment with the AWIC is likely to receive extra consideration in terms of employment, since AWIC cannot affort to provide continuous training for professional staff and emphasizes hiring candidates who are felt less likely to move or change jobs.

F. Conclusion

Although the Alabama Water Improvement Commission expects to take over the NPDES permitting program and other elements of the construction grants program from EPA during FY 2977, commission officials do not

anticipate sizable staff increases in the next five-year period. The commission experiences a relatively high average annual turnover rate because of engineers and younger staff changing jobs or being recruited by the private sector. Based on past history, the Alabama Legislature is considered unlikely to provide financial support for major staffing increases. Most growth will likely involve filling positions that are currently authorized, but for which funds have not been allocated.

VIII. ENERGY

A. Introduction

The State of Alabama has two energy-related organizations. One is the Alabama Energy Advisory Council in Birmingham which was set up under the Governor's enabling authority to conduct comprehensive, in-depth studies which identify demand trends and supply potentials for all forms of energy. It was also created to reconcile environmental quality requirements with energy needs, to study incentives necessary for resource development and to make recommendations to the Governor on the most effective use of the state's energy resources. The Council membership is currently twelve persons appointed by the Governor. The other Alabama energy-related agency is the Alabama Energy Management Board, created by an Executive Order of the Governor on November 8, 1973, to advise the Governor on energy matters and to develop an equitable distribution of energy supplies in Alabama. Other responsibilities of this Board include:

1) Prepare the necessary studies of the sources of energy available to the State of Alabama;

2) Prepare plans and programs for the conservation of all available energy;

3) Prepare plans and procedures for the implementation of all state and federal laws, rules and regulations pertaining to energy resources, supplies and distribution and recommend to the Governor such plans and programs as may be necessary for implementation.

The Alabama Energy Management Board is presently made up of seven Board members and had a total 1975 budget of $120,000. Major programs include fuel allocation, natural gas curtailment and energy conservation.

The Tennessee Valley Authority's Brown's Ferry nuclear power plant is the largest in the world and recently reached full capacity of almost 3.3 million killowatts in January, 1977. The three-reactor nuclear power plant is the largest generating plant of the seven-state TVA power system. According to an Associated Press news article appearing in the Atlanta journal on January 19, 1977, the Brown's Ferry plant has been estimated to be generating about fifteen percent of the total power generated by the TVA system during the first three weeks of January, 1977, when the region was experiencing unusually cold weather. The Tennessee Valley Authority is now constructing two 1,213-megawatt reactors near Scottsboro, and the first of these is to become operational in 1980.

The TVA Radiological Hygiene Branch and Air Quality Branch staff are located at Muscle Shoals in Alabama. The Radiological Hygiene Branch staff conduct environmental radioactivity monitoring at TVA's nuclear power sites and provide health physicists for the sites. The Branch also maintains a radioanalytical laboratory and dosimetry facilities to analyze environmental samples and to evaluate personnel radiation exposures. Staff develop radiological hygiene standards and procedures for use at planned and operating nuclear sites and evaluate plans for nuclear facilities.

Alabama Power Company operates two nuclear power reactors in Dothan, Alabama. The two reactors are Joseph M. Farley Units and have a total capacity of 1,658,000 killowatts. The first of these plants is scheduled to begin commercial operation in 1977. Alabama Power has also recently ordered four 1,170 megawatt units for the Barton Plant at Verbena. Alabama Power's environmental response capabilities are centered in its Division of Environmental and Technical Services which are headquartered in

Birmingham. Division personnel stated that the company has run an austerity program in the last three years and all operations not directly related to plant operations have been eliminated.

B. Workforce Profile

The Alabama Energy Management Board is headed by a staff director, Mr. Edwin G. Hudspeth. Mr. Hudspeth oversees three clerks and a secretary and there are no professionals on his staff. The clerks are actually paraprofessionals and they are considered by Mr. Hudspeth to be expert in case resolution. The Board's staff has undergone dramatic decreases in staffing level since 1974, when twenty-six persons were employed by the Board following the energy crisis after the Arab embargo.

The Tennessee Valley Authority's Radiological Hygiene Branch and Air Quality Branch of the Division of Environmental Planning are both headquartered in Muscle Shoals, Alabama. Both Branches employ a total of 234 persons to control and abate environmental pollution for the TVA facilities. The current (1976) staffing levels for these two Branches are as follows.

TABLE XX

TENNESSEE VALLEY AUTHORITY

Division of Environmental Planning
Air Quality Branch
Current (1976) Staffing Level

Position	1976
Degreed:	
Engineer	8
Meteorologist	13
Chemist	17
Physicist	5
Business	5
Other	46
College, no degree	35
No College	38
Associate Degree	1
TOTAL	168

TABLE XXI

TENNESSEE VALLEY AUTHORITY

Division of Environmental Planning
Radiological Hygiene Branch
Current (1976) Staffing Level

Position	1976
Nuclear Engineer	5
Safety Engineer	1
Chemist	8
Physicist	9
Radiological Health	1
Health Physicist	2
Other Degree	3
Associate Degree	1
Some College	14
Radiological Technician	1
High School Degree	16
TOTAL	66

TVA sources estimated that each nuclear power plant operated by the Authority has five health physicist technicians and two health physicists on staff. There are three nuclear power plant units currently in operation at Dothan, so there are an estimated fifteen health physicist technicians and six health physicists working at the plants at Dothan, at present. TVA's total environmental pollution control and abatement staff in Alabama is currently estimated at 255 persons.

Alabama Power Company's Division of Environmental and Technical Services currently employs a total of 32 persons. The Division is composed of the Division Manager, 23 professionals, and eight clerical and support personnel. The Division of Environmental and Technical Services is composed of three basic sections which include:

1) Computer Services Section: Provides computer services to the Division. Composed of two systems analysts and one co-op student.

2) Environmental and Technical Studies Section: Composed of an Analytical Studies and Environmental Reports Group, a Siting, Research Administration and Regulation and Treatment Development Group, and a Biological Studies Group.

3) Permits and Environmental Surveillance Section: Composed of an Air Permitting and Surveillance Group, a Water Permitting Group and a Water Surveillance Group.

The Analytical Studies and Environmental Reports Group perform air, water and energy studies and are in charge of civil and mechanical engineering functions of the Alabama Power Company. The Siting, Research Administration, Regulation and Treatment Development Group performs special studies for the Company. The Biological Studies Group is responsible for the performance of biological aquatic studies and the persons involved in the performance of such tasks are stationed at power plants which are located on rivers in Alabama. The following table depicts current workforce staffing levels for pollution control and abatement personnel of Alabama Power Company:

TABLE XXII

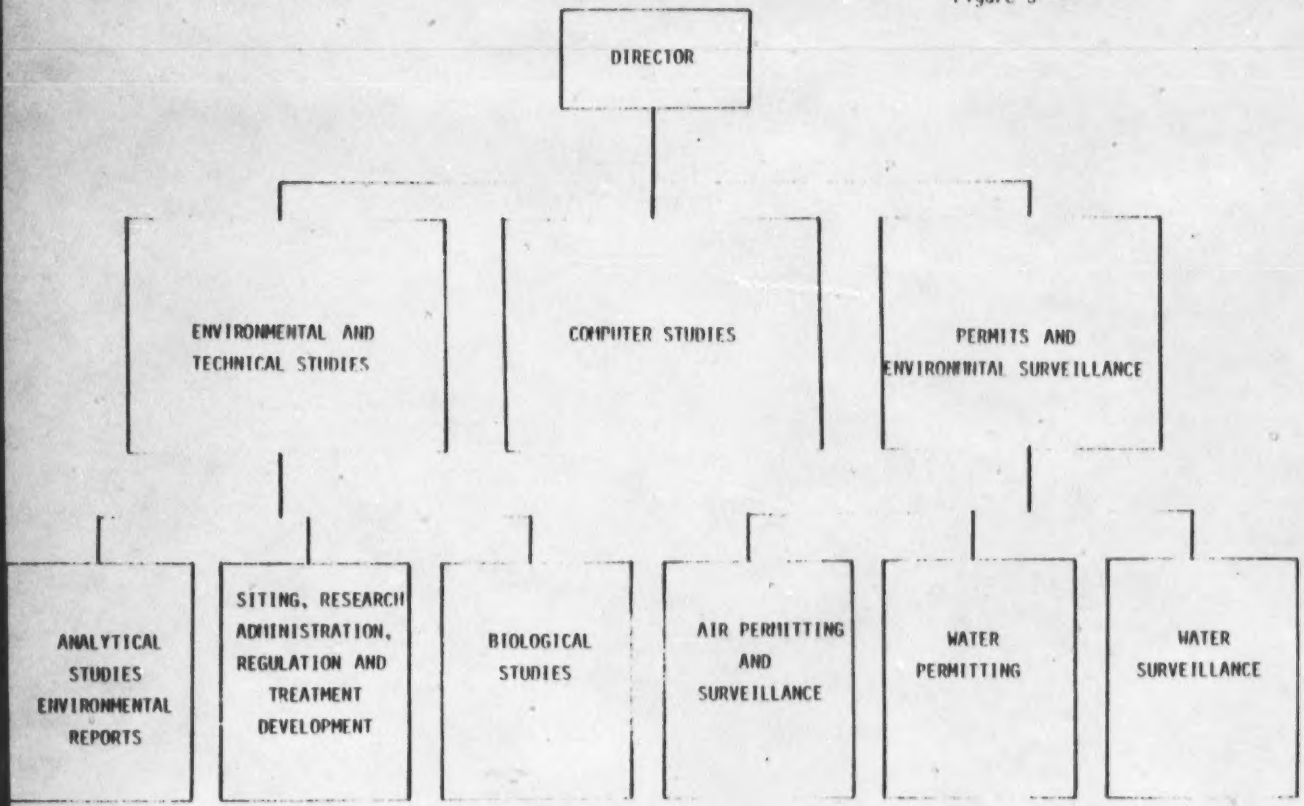
ALABAMA POWER COMPANY

Division of Environmental and Technical Services
Current (1976) Staffing Level

Position	1976
Engineer	8
Engineering Specialist	1
Biologist	6
Chemist	8
Systems Analyst	2
Engineering Aide	2
Draftsman	1
Co-op Student	2
Secretary	2
Manager	1
TOTAL	33

ENVIRONMENTAL and TECHNICAL SERVICES
ALABAMA POWER COMPANY

Figure 5



C. Workforce Projections

The Staff Director of the Alabama Energy Management Board is not confident that his present staff will increase in size over the next five year period. If funds are available, Mr. Hudspeth would like to recruit an industrial engineer, a statistician and an economist by 1982. Three professional engineers and a data management specialist would be utilized to perform special studies for the Board.

Tennessee Valley Authority officials project a 31 percent per year rate of growth for the Radiological Hygiene Branch over the next five years as more and more TVA nuclear power plants become operational. The Branch is expected to increase in staff from the present level of 66 positions at the present time to 237 positions by the end of 1981. Most of the growth will be centered among the nuclear engineering positions. The Radiological Hygiene Branch experiences an annual rate of turnover of about eight percent.

Alabama Power Company officials expect to be conducting more monitoring activities over the next five years as NPDES permits have now been issued for most of Alabama Power's plants. New hazardous waste legislation is not anticipated to affect Alabama Power Company's operations. Mr. Miller, head of the Environmental and Technical Studies Section, stated that the Division of Environmental and Technical Services personnel closely monitor the Federal Clean Air Act to anticipate any future directions that EPA may take in the control and abatement of air pollution. Division officials expect Congress to eventually pass Amendments to the Clean Air Act and Alabama Power Company has been responsive in assisting the State of Alabama's air program in achieving the goals of the State Implementation Plan.

D. Training and Certification

Alabama Energy Management Board staff do not participate in any training programs at the present time. For specific training and certification programs participated in by Tennessee Valley Authority environmental pollution abatement and control personnel, refer to the TVA section of the Tennessee report.

Alabama Power Company officials are pleased with the competence and quality of training courses offered by the U.S. Environmental Protection Agency. The courses conducted by the EPA Air Pollution Training Institute are considered to be of high quality by Division of Environmental and Technical Services personnel and courses offered are closely monitored. Alabama's two major universities, the University of Alabama and Auburn University are considered to have excellent engineering programs and the Company receives most of its outside training from these two universities. Most of the Company's biologists are recruited from Auburn University's Fisheries and Biology School. Engineering personnel are sent to short courses offered by Auburn University's extension center. The Birmingham branch of the University of Alabama offers accredited engineering courses that are much longer in duration than the extension center's, and they are well attended. Alabama Power Company pays tuition and expenses if Company employees attend courses that are job-related and offered by either of these two universities. Division personnel generally attend night classes and usually are sent for courses offered in the day if they only last between two to three days. Alabama Power Company primarily hires mechanical or civil engineers as they have found that most universities do not offer specialities in environmental areas. Power Company engineers develop expertise in specialized environmental areas through short courses

offered by the extension center or through on-the-job experience. Company sources expect a new engineer to become functionally proficient after about one year's experience with the company.

The following types of courses were felt by Alabama Power Company sources to be of special benefit to the Division of Environmental and Technical Services in upgrading personnel technical skills over the next five years:

1) Courses felt to be directly applicable to the Environmental and Technical Studies Section's special studies activities:
   a) Air Dispersion Modeling
   b) Air Pollution Meteorology
   c) Water Quality Modeling
   d) Thermal Plume Modeling
   e) Cooling Pond Modeling

2) Courses or special studies directly applicable to the work of the Permits and Environmental Surveillance Section:
   a) Ambient Air Maintenance and Calibration Procedures
   b) Stack Monitoring Maintenance and Calibration Procedures
   c) Quality Control of Data
   d) Sampling Techniques
   e) Inspection of Wastewater Treatment and Facilities

E. Career Potential

New careers or potential for growth in staffing levels of the Alabama Energy Management Board may result from increased federal grant money being allocated for planning, energy conversion and conservation activities in the next five years because of the growing energy problem. Alabama Power Company officials do not anticipate any new careers in pollution abatement and control as it relates to energy production. Alabama Power Company does not retain any consultants for environmental work as Division officials consider their current organization to be capable of handling any environmental problem that may arise.

F. Conclusion

The Energy Management Board and Energy Advisory Council represent the two state bodies principally concerned with energy matters in Alabama. The Council was established to assess demand trends and supply potential for all forms of energy and to reconcile environmental matters associated with energy source development and production. The major activities of the Board include fuel allocation, natural gas supply and energy conservation. While both offices have heavy work loads, neither is expected to experience any substantial growth over the next five years. Alabama will likely respond to office and program development in terms of future federal energy policy.

Nuclear power facilities, e.g., utilities and TVA, located in Alabama will have an increasingly important role in the state's environmental strategies as programs to ensure safety from radioactive materials will require regular monitoring and inspection activities. The majority of the effort will be handled by federal and utility staff; however, the state may be obliged to add a minimal number of people with training in nuclear engineering, health physics and other radiation related fields.

Although nuclear power development is more significant in Alabama than in many other states, it must be noted that it is the country's eighth largest producer of coal. And, current energy development trends will make coal use an important factor in Alabama's energy future. To this end, the University of Alabama has been conducting research concerning coal gasification and liquifaction. Rust Engineering, a consultant firm, has applied for a grant to construct a coal gasification plant. Further, Alabama Power, with two reactors already on line and four more ordered, is also conducting research on the solvent refining of coal at its facil-

ities in Wilsonville. The preceding represents areas of activity which may require state program personnel to carry out inspection and monitoring activities.

As in other fields of pollution control and abatement, the future trend seems to be one where the bulk of activities will filter finally to local and private authorities with the state performing monitoring and surveillance tasks. However, the problems of ensuring a quality environment for the state is complicated by the fact that the state cannot or is unwilling to assume responsibility for federally initiated and funded programs which are too frequently too expensive for state and local authorities to maintain on a long term basis.

In summation, the Alabama situation in energy portends active growth and development in both coal and nuclear areas. Related workforce growth will be a corollary of several factors: 1) Federal energy policy; 2) The level of federal funding assistance to state and local energy programs; 3) State energy commitments to energy activities. In any case, state officials anticipate only minimal growth. Most positions, and they will be for a cadre of highly trained professionals, supported by intensively trained technicians, will occur in the private and local/municipal sectors. Growing federal activity, i.e., TVA, will offer a number of similar positions. Engineers and scientists with backgrounds in energy related fields will find the most attractive positions.

Selected Post Secondary Institutions With Formal Environmental Energy Programs

The following pages provide detailed information regarding two environmental education programs in Alabama: the bachelor-level Civil Engineering program with environmental emphasis offered at the University of Southern Alabama and the Environmental Sciences Certificate program of the University of Alabama in Huntsville. Information concerning these offerings were supplied by professionals within these institutions. Data have also been extracted from college catalogs, and other available materials.

Additional environmental curricula are offered within the state at the bachelor, master and doctoral level. Auburn University's School of Engineering offers in its Chemical Engineering and Civil Engineering Departments courses in environmental and energy fields. These courses include: Nuclear Engineering, Industrial Waste Treatment, Health Physics, Water Supply and Disposal Systems, Air Quality Engineering and Water and Wastewater Treatment. In the Biology Department of Auburn University at Montgomery are two environmental options: the Environmental Studies Option and the Environmental Technology Option.

The Tuskeegee Institute offers a master's degree in Environmental Sciences in its School of Applied Sciences. Bachelor-level degrees in Mineral Engineering and Civil Engineering (with environmental coursework) are offered at the University of Alabama. This institution also offers master's degrees in Mineral Engineering and Environmental Engineering. The latter program makes use of environmental engineering courses and appropriate courses in biology, chemistry, geology and microbiology.

Courses are available in water supply, wastewater, air pollution, industrial waste and radiation. Alabama A & M University offers a B.S. degree in Environmental Science designed to prepare students for graduate study in environmental or related sciences and positions of technician level with governmental agencies and industries. Required courses include Ecology, Soil and Water Conservation, Air Pollution, Soil and Water Pollution and Soil, Plant and Water Analysis.

An Associate in Applied Science in Aquatic Technology is offered at the Southern Union State Junior College. This two-year program is designed for students seeking employment in agencies that are responsible for water environmental control. Included in the curriculum are courses that relate to bioassay techniques, water analysis, limnology, management of water impoundments, aquatic plants and fresh water fishes.

SENIOR INSTITUTIONS

University of Southern Alabama
Mobile, Alabama

Program: Civil Engineering (B.S.) (environmental emphasis)

Hours required for major: Quarter - Major 191; Minor 29.
Program Inception: 1967
Staff Size: Three professors, one associate professor, four instructors. (4 Ph.D.s, 4 M.S.)
Enrollment: 15 in civil engineering - 5 with environmental pollution option
Graduates (1976): 15 in civil engineering - 5 with environmental pollution option.
Placement: 14
Graduate work: 1

Courses (Undergraduate - Major)

Civil Engineering Orientation I
Civil Engineering Orientation II
Basic Engineering Surveying
Topographic Surveying
Route Surveying
Structural Mechanics I
Structural Mechanics II
Engineering Economics
Basic Soil Mechanics
Soil Mechanics
Fluid Mechanics and Hydraulics
Sanitary Analysis I
Water Supply and Wastewater Treatment
Structural Mechanics III
Structural Analysis
Structural Steel Design
Engineering Reports
Ethics and Jurisprudence
Construction Costs and Management
Construction Administration
Construction Materials
Advanced Soil Mechanics
Highway Engineering
Advanced Highway Engineering
Water Treatment
Hydrology
Sanitary Analysis II

Water Pollution Control
Air Pollution Control and Solid Waste Disposal I
Air Pollution Control and Solid Waste Disposal II
Pollution Control: Wastewater Treatment
Pollution Control: Industrial Waste Treatment
Reinforced Concrete Design
Foundations
Indeterminate Structures
Timber Engineering
Prestressed Concrete
Highway Bridges and Culverts
Independent Study

Courses (Undergraduate - Minor)

Sanitary Analysis I
Water and Wastewater
Water Treatment
Hydrology
Air Pollution Control I
Air Pollution Control II
Wastewater Treatment II

University of Alabama in Huntsville
Huntsville, Alabama

Program: Environmental Sciences Certificate (supplement to B.S., M.S., Ph.D.)

Hours required for certificate: Semester - 51
Program Inception: 1973
Staff Size: Two professors (Ph.D.'s), one associate professor, two lecturers (Ph.D.'s) and other faculty from School of Science and Engineering (all Ph.D.'s)
Enrollment: 5
Number of Certificates Issued: 0

Courses

Biology
Chemistry
Environmental Science
Physics
Statistics
Computer Science
Principles of Ecology
Environmental Climatology
Environmental Meteorology
Environmental Geology and Hydrology
Pollution Problems
Plant Ecology
Animal Ecology
Microbial Ecology
Limnology
Physiological Ecology
Marine Ecology
Marsh Ecology
Marine Geology
Environmental Chemistry
Environmental Engineering
Introduction to Human Engineering
Management Science
Systems Analysis
Selected Topics in Mechanical Engineering
Environmental Data Analysis

State Legislation

ALABAMA AIR

TITLE:

Air Pollution Control Act of 1971
Alabama Code, Act No. 769

PURPOSE:

To achieve and maintain levels of air quality to protect human health, and to coordinate state air pollution prevention and abatement programs.

DEFINITIONS:

1. Air pollution
2. Air contaminant
3. Commission
4. Person
5. Emission
6. Director

ADMINISTERING AUTHORITY:

Department of Public Health
Air Pollution Control Commission

AUTHORIZATIONS:

To issue regulations pursuant to the act;
To establish ambient air quality standards;
To establish fuel and other emission standards;
To develop a comprehensive air pollution control plan;
To conduct studies regarding air pollution;
To administer grants and act as the state lead agency in air pollution matters;
To monitor air pollution in the state;
To approve construction of air pollution sources;
To enforce orders of Governor regarding air pollution;
To grant variances;
To control motor vehicle emissions.

PROHIBITED ACTS:

To allow or cause air pollution in violation of quality standards;
To violate or fail to obtain construction or operation permits;
To violate any regulation or provision of the act.

PENALTIES:

Civil - Fines of up to $10,000 and $10,000 per day;
Criminal - one year in jail.

ALABAMA PESTICIDES

TITLE:

Custom Application of Pesticides Act
Alabama Code, Act No. 1957

PURPOSE:

To regulate the application of pesticides in the public interest and to require the certification of pesticide applicators.

DEFINITIONS:

1. Active ingredient
2. Adulterated
3. Aircraft
4. Antidote
5. Bactericide
6. Board
7. Commissioner
8. Contamination
9. Custom application of pesticides
10. Defoliant
11. Desiccant
12. Device
13. Fungi
14. Fungicide
15. Ground equipment
16. Herbicide
17. Inert ingredient
18. Ingredient statement
19. Insect
20. Insecticide
21. Label
22. Labeling
23. Licensed pesticide dealer
24. Low volume
25. Misbranded
26. Nematocide
27. Nematode
28. Official sample
29. Person
30. Pesticide
31. Pesticide use permit
32. Plant regulator
33. Registrant
34. Restricted use pesticide
35. Rodenticide
36. Ultra low volume
37. Weed

ADMINISTERING AUTHORITY:

Board of Agriculture and Industries
Pesticide Advisory Committee

AUTHORIZATIONS:

To issue regulations pursuant to the act and pesticide usage;
To enter and inspect property in enforcement of the act;
To categorize and certify commercial applicators;
To regulate storage, transporation, labeling and disposal of pesticides.

CERTIFICATION OR LICENSING:

Commercial applicators in demonstration, agricultural, forest and right-of-way pest control must be certified; examination on knowledge required.

PROHIBITED ACTS:

To engage in custom application without license;
To handle or dispose of pesticides or containers in manner harmful to environment.

EXEMPTIONS:

Structural or household pest control;
Lawn, tree and shrub application;
Farmers on own land;
Local governmental units.

PENALTIES:

Fines of from $25 to $500 or six months imprisonment.

ALABAMA POTABLE WATER

TITLE:

Public Water Supply Systems and Waste Water Treatment Plants Law
Alabama Code, Act No. 1594

PURPOSE:

To protect the public health and water resources of the state through the certification of facility operators.

DEFINITIONS:

1. State health officer
2. Board
3. Certificate
4. Water supply system
5. Water treatment plant
6. Waste water treatment plant
7. Water distribution system
8. Operator
9. Trainee

ADMINISTERING AUTHORITY:

State Health Officer
Board of Certification

AUTHORIZATIONS:

To classify all water and waste water treatment plants and distribution systems;
To certify all facility operators;
To establish certification standards;
To issue regulations pursuant to the act.

CERTIFICATION OR LICENSING:

Operators must be certified at level corresponding to the facility; examination required except for prior operators.

PROHIBITED ACTS:

To operate a treatment or distribution facility without certified operator;
To perform operator duties without proper certification.

EXEMPTIONS:

Counties with population over 600,000.

PENALTIES:

Fines of up to $100 or 30 days in jail.

ALABAMA RADIATION

TITLE:

Radiation Control Act
Alabama Code, Act No. 582

PURPOSE:

To provide for a regulatory program of ionizing radiation sources, and to encourage the development of peaceful uses of ionizing radiation sources.

DEFINITIONS:

1. Byproduct material
2. Ionizing radiation
3. General license
4. Specific license
5. Person
6. Source material
7. Special nuclear material

ADMINISTERING AUTHORITY:

State Board of Health
Radiation Advisory Board

AUTHORIZATIONS:

To regulate, evaluate and control radiation materials;
To issue regulations pursuant to the act;
To cooperate with other state and federal agencies in radiation matters;
To conduct studies regarding ionizing radiation;
To issue licenses to those who use or possess various radiation sources and materials;
To enter and inspect property in enforcement of the act;
To require the maintenance of certain records.

PROHIBITED ACTS:

To use, manufacture, transport or possess any source of ionizing radiation without proper license;
To violate any regulation or provision of the act.

EXEMPTIONS:

Can be granted by Board from registration or licensing requirements.

PENALTIES:

Fines of up to $1,000 or one year in jail.

NRC AGREEMENT STATE: Yes

ALABAMA SOLID WASTE

TITLE:

Hazardous Wastes Management Act of 1976
Alabama Code

PURPOSE:

To provide for the regulation of transportation, treatment and disposal of hazardous wastes, other than radioactive wastes.

DEFINITIONS:

1. Board
2. Committee
3. Hazardous waste management
4. Hazardous wastes
5. Generator
6. Person
7. Waste
8. Transportation
9. Manifest
10. Trade secret
11. Storage
12. Treatment
13. Treatment facility
14. Disposal
15. Disposal site

ADMINISTERING AUTHORITY:

State Board of Health
Hazardous Waste Technical Advisory Committee

AUTHORIZATIONS:

To issue regulations regarding the transportation, treatment and disposal of hazardous wastes;
To acquire necessary disposal sites;
To supervise the operation of all hazardous waste disposal sites;
To issue permits for transportation and disposal of hazardous wastes.

PROHIBITED ACTS:

To fail to have a permit when engaged in transportation or disposal;
To dispose of hazardous wastes in violation of regulation or act provision;
To fail to identify and label all hazardous waste generated.

ALABAMA SOLID WASTE

TITLE:

Solid Wastes Disposal Act
Alabama Code, Act No. 771

PURPOSE:

To provide for the control and disposal of solid wastes and to authorize county and municipality action with regard to solid wastes.

DEFINITIONS:

1. Title
2. Solid wastes
3. Garbage
4. Ashes
5. Rubbish
6. Open dump
7. Unauthorized dump
8. Sanitary landfill
9. Landfill
10. Hazardous wastes
11. Hazardous wastes Incinerator
12. Composting/compost plant
13. Health department
14. Agency

ADMINISTERING AUTHORITY:

State Department of Health
Local Governmental Units

AUTHORIZATIONS:

To make solid waste collection and disposal facilities available;
To approve disposal sites and facilities;
To conduct necessary vector control activities;
To license private solid waste operations;
To generally enforce the act.

PROHIBITED ACTS:

To burn garbage or rubbish other than in approved incinerators;
To allow litter from hauling operations;
To use or allow unauthorized dumps;
To dispose of hazardous wastes with other solid waste.

EXEMPTIONS:

Certificates issued for household, business or industry disposal on own property.

PENALTIES:

Fines of from $5 to $100.

ALABAMA WASTE WATER

TITLE:

Water Improvement Commission Act
Alabama Code, Act No. 1260

PURPOSE:

To create a water improvement commission and provide for greater water pollution control.

DEFINITIONS:

1. Commission
2. Waters
3. Pollution
4. Sewerage
5. Industrial wastes
6. Other wastes
7. Person

ADMINISTERING AUTHORITY:

Water Improvement Commission

AUTHORIZATIONS:

To control water pollution in the state;
To conduct studies and investigations regarding water pollution;
To establish pollution standards;
To propose pollution abatement measures;
To require the maintenance of discharge records;
To administer water discharge permit program;
To issue pollution abatement orders;
To act as the state lead agency in water pollution matters.

PROHIBITED ACTS:

To allow or cause water pollution;
To violate the terms of any discharge permit;
To violate any regulation or act provision.

PENALTIES:

Fines of from $100 to $10,000;
Liability imposed for clean-up activity and fish and wildlife damage.